Team for Research on Methanol-to-Olefins Technology

Olefins, traditionally derived from oil, are important basic materials for the modern chemical industry. To make olefins from coal rather than oil has been a dream and also a big challenge for scientists all over the world. The step from methanol to olefins is vital in the transformation from coal or natural gas to olefins, as technologies for turning coal into methanol and olefins into other chemicals have been well established. The team at the CAS Dalian Institute of Chemical Physics (DICP) tackled the hard-nut problems and developed critical catalysts and a set of technologies for the methanol-to-olefins transformation (DMTO). They successfully accomplished a ten-thousand-ton scale industrial test, the first of such kind in the world, in June 2006, and then in May 2010 a further industrial demonstration for an upgraded version of this technology (DMTO-II), which features higher efficiency of transformation and a higher yield of olefins.

DMTO Technology was licensed to the Shenhua Group Corporation Limited for the construction of the world's first coal-to-olefin plant including the units capable of transforming 1.8 million tons of methanol into 600 thousand tons of olefins a year. This project was approved by the National Development and Reform Commission at the end of 2006. The DMTO units were successfully launched for operation in August 2010, and the whole plant

1

went into formal commercial operation later in January 2011.

The industrialization of the technologies for coal-based olefins synthesis remained in the spotlight and was ranked among the top ten S&T progress events of China in 2010. It takes a leading position in the international chemical industry in terms of the industrialization pace, as well as the scale and performance of the technology.

The successful development and industrialization of DMTO/DMTO-II have far-reaching implications for boosting the methanol-to-olefins industry as well as the implementation of the "replacing oil with coal" strategy.

Profs. LIU Zhongmin, XU Lei and LÜ Zhihui at DICP received the honor as prominent contributors to the research. Among them, Prof. LIU Zhongmin, leader of overall DMTO development, proposed the overall technological approach and designed the experiments. He also saw through the implementation of the research, pilot experiments and industrialization. Another leader of the team, Prof. XU Lei contributed mainly to the development of catalysts, and Prof. LÜ Zhihui to the industrial experiments and commercial promotion of DMTO. Other 17 researchers were also awarded as main participants in the DMTO research and development.

1 The commercial unit at Shenhua Group in Baotou City based on the DMTO technology developed by the DICP team led by Prof. LIU. To make olefins, a kind of basic materials for chemical industry, from coal rather than oil has been a dream and also a big challenge for scientists all over the world. The team's work has provided a solution to the long-standing hard-nut problem of transforming methanol into olefins, a vital step in turning coal or natural gas to olefins.

2 The demonstration unit for DMTO-II, an upgraded version of DMTO technology.